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Sand type filters are covered in this standard. The filters described are intended to be designed and used specifically for swimming pool water filtration, both public and residential. Included are the basic components which are a necessary part of the sand type filter such as filter housing, upper and lower distribution systems filter media, supporting material (when required) piping, valves, gauges, and other accessories as required for the proper function and operation of such filters. Standard includes--(1) minimum requirements, (2) definitions, (3) materials, and (4) design and construction. A final section includes recommendations for installation and operation. (RH)

EDO 25899

NATIONAL SANITATION FOUNDATION

STANDARDS

SAND TYPE FILTERS for SWIMMING POOLS

EF 001890

Standard Number

10

SECTION 1 of the NATIONAL SANITATION FOUNDATION
HEALTH RELATED SWIMMING POOL EQUIPMENT STANDARDS

SEAL OF APPROVAL

To identify equipment that has met
NSF Standards & Criteria
(Colors: blue, gray and white.)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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NATIONAL SANITATION FOUNDATION

STANDARD No. 10

Relating to

SAND TYPE FILTERS

for

SWIMMING POOLS

Prepared by the

NATIONAL SANITATION FOUNDATION COMMITTEE

ON

SWIMMING POOL EQUIPMENT STANDARDS

Adopted January 1961

Printed as Revised

October 1966

THE NATIONAL SANITATION FOUNDATION
Ann Arbor, Michigan

Price $1.00

This is one of a series of nationally uniform sanitation standards and criteria established by the National Sanitation Foundation.

Current Standards and Criteria include:

No. 1 Soda Fountain and Luncheonette Equipment
No. 2 Food Service Equipment
No. 3 Spray-Type Dishwashing Machines
No. 4 Commercial Cooking and Warming Equipment
No. 5 Commercial Hot Water Generating Equipment
No. 6 Dispensing Freezers
No. 7 Commercial Refrigerators and Storage Freezers
No. 8 Commercial Powered Food Preparation Equipment
No. 9 Diatomite Type Filters for Swimming Pools
No. 10 Sand Type Filters for Swimming Pools
No. 11 Recessed Automatic Surface Skimmers
No. 12 Automatic Ice Making Equipment
No. 14 Thermoplastic Materials, Pipe, Fittings, Valves and Joining Materials
No. 15 Thermoset Plastic Pipe, Fittings, Valves, Tanks, Appurtenances, Joining Materials, & Thermoset Plastic Coatings for Use in Potable Water Supply Systems
No. 16 Film Badge Services
No. 17 Centrifugal Pumps for Swimming Pools
No. 18 Manual Food and Beverage Dispensing Equipment
No. 19 Chemical Feeders for Swimming Pools
No. 20 Bulk Milk Dispensers
No. 21 Thermoplastic Refuse Containers
C-3 Food Vending Machines
C-2 The Evaluation of Special Equipment and/or Devices
C-4 Reinforced Plastic Tanks
C-5 Cartridge Type Drinking Water Filters
C-6 Cloth Towel Dispensers
C-7 Plastic Lined Asbestos-Cement Pipe
C-8 Pitless Well Adapters

The National Sanitation Foundation

PURPOSE

IN 1944 A SMALL GROUP of industrial and public health leaders were discussing nutual problems involving sanitation. They realized that modern sanitation problems affecting industry and the public health could better be solved through mutual understanding and cooperative action to produce sound, effective educational programs and to foster public knowledge, rather than through ordinances, inspections and law enforcement alone.

It occurred to them that great strides could result from the creation of an independent but authoritative liaison organization which would be a clearing house through which business, industry and health authorities could work together for the solution of common problems and for the common good.

They realized that through such an organization they could foster the research and educational programs so essential to keeping abreast of the technological advances of industry, with modern products and services, and with the daily lives of the people.

Thus was born the National Sanitation Foundation with Headquarters in the School of Public Health of the University of Michigan at Ann Arbor, Michigan.

The National Sanitation Foundation is a non-commercial, non-profit organization seeking solutions to all problems involving cleanliness and sanitation. It is dedicated to the prevention of illness, the promotion of health and the enrichment of the quality of American living through preplanning of preventative programs for the improvement of the environment.

The National Sanitation Foundation fulfills the important purpose of arranging for a common meeting ground where industry and public health may discuss and solve common problems.

PROGRAM

The program of the National Sanitation Foundation (started in 1948 at the National Sanitation Clinic by some 500 of the nation's leading public health authorities, businessmen and industrialists) encompasses five basic areas of activity:

BASIC AND APPLIED RESEARCH: The need for an enlarged research program in the field of environment was recognized by

the Clinic as pressing. Many problems and uncertainties are currently answered by a multiplicity of curbstone opinion. Only through seeking out and defining the answers thereto, can sanitation attain the status it deserves.

STANDARDS: The need for uniform equipment standards was pointed out by both industry and public health groups. Numerous National Sanitation Foundation Standards have been developed, and additional Standards are in various stages of completion. These Standards, based on scientific fact, have been developed on a cooperative basis by representatives of industry and professional public health officials and are the result of comprehensive study and review by all concerned groups.

TESTING LABORATORY: The need for an independent testing laboratory where applied research relative to sanitation methods, materials and equipment could be conducted objectively had been expressed many times by industry and public health. The 1948 Clinic emphasized that such a laboratory where tests may be made and, when merited, approval given would serve as a valuable contribution to the improvement of environment throughout the country. The National Sanitation Foundation Testing Laboratory was established in 1952 to fulfill this need and serves both industry and public health sanitation interests.

SEAL OF APPROVAL: A Seal of Approval, or some means of identifying items of equipment or devices meeting high public health standards, was specified by the Clinic to be an urgent need. Following the establishment of the National Sanitation Foundation Testing Laboratory, an official Seal of Approval was adopted and may be authorized for use by industry on equipment found to conform with National Sanitation Foundation Standards. A continuing program of evaluation for equipment, devices or products authorized to bear the Seal was implemented and annual renewal of such authorization is required.

EDUCATION: Only through an adequate program of education is it possible to translate the results of research to health officials, business and the public. Several programs have been established for the expressed purpose of implementing and conducting basic and applied research activities in the fields of education, methodology, working relationships and communications between the public, industry, academic interests, professional public health workers and official agencies.

PREFACE

This Standard, covering Sand Type Filters, is one in a series of NSF Standards for Swimming Pool Equipment. These Standards are being developed and issued in recognition of the need for a common understanding of the problems of sanitation involving industry and administrative health officials whose obligation it is to enforce regulations.

These Standards are the result of considerable study on the part of public health officials, consultations with technical representatives of industry, and investigations by the National Sanitation Foundation's staff. The improvement of environmental health and sanitation and the establishment of uniform requirements have been the primary aim in the preparation of these Standards. However, it is recognized that continued technological progress will require periodic changes.

The adoption of these Standards offers health officials an opportunity to present a united front in securing the basic equipment necessary for the safe and efficient operation of swimming pools, private or public. It gives users of such equipment the assurance of meeting health standards and of satisfactory performance when properly operated. Also, NSF Standards give manufacturers the advantage of applying uniform design and construction methods with confidence that equipment conscientiously built to meet said Standards will be generally acceptable.

Finally, as an aid to all concerned in recognizing approved equipment, the National Sanitation Foundation Testing Laboratory has established a program under which the use of its insigne, nSf, can be authorized on filters that meet the requirements herein established for Sand Type Filters for Swimming Pools.

Permission to use the National Sanitation Foundation Testing Laboratory's Seal of Approval is granted only after evaluation of the applicant's manufacturing methods and performance testing of his filters shows compliance with the Standard. Continuance of authorization to use the nSf Seal of Approval is dependent upon evidence of compliance with the Standard through periodic re-evaluation of equipment in factory and field.

Sincere appreciation is extended to all members of the Committees herein listed who so willingly devoted their time to the development of this and other Standards. Special credit and thanks are due the members of the NSF Committee on Swimming Pool Equipment

Standards for the long hours spent in review, discussion and correspondence as well as to the Industry Advisory Committee for its untiring efforts in this work.

Henry F. Vaughan, Dr. P. H., President
National Sanitation Foundation

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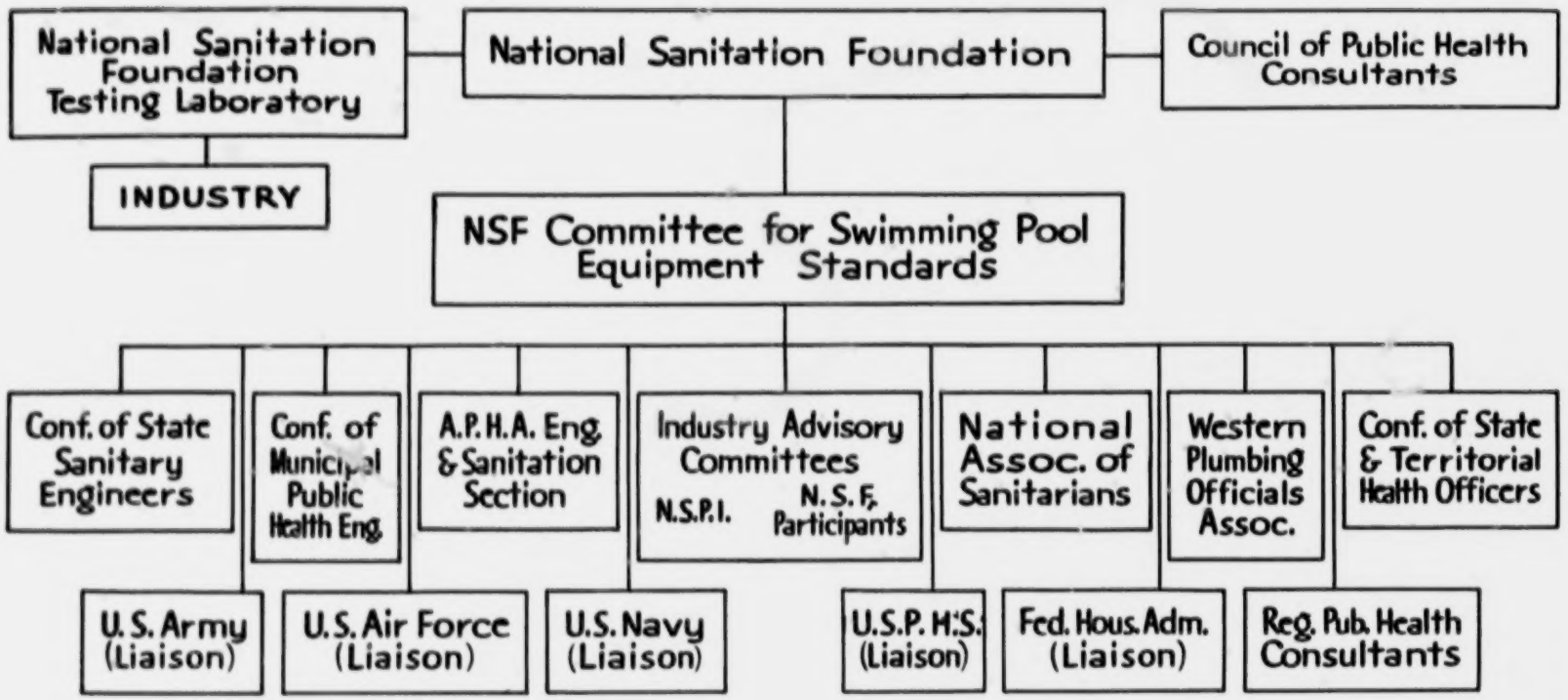
EQUIPMENT STANDARDS



SUGGESTIONS CONCERNING REGULATIONS GOVERNING SAND TYPE FILTERS FOR SWIMMING POOLS

It is strongly recommended that these Standards, representing a cross-section of opinion of workers in the field of environmental health, be accepted and followed by enforcement officials. However, their incorporation in detail into local sanitary codes does not appear to be necessary and is likely to be cumbersome.

In municipalities, counties, and health districts in which the adoption of legislation by reference is considered legal, the following regulation should serve to implement the use of this Standard for Sand Type Filters:

> ALL SAND TYPE FILTERS INSTALLED ON OR AFTER_____ _____ IN PUBLIC OR PRIVATE SWIMMING POOLS IN THIS JURISDICTION SHALL MEET THE NATIONAL SANITATION FOUNDATION STANDARDS FOR SUCH EQUIPMENT.

Or, if considered desirable, it will be simpler to adopt the following more general regulation applying to all NSF Standards in the swimming pool equipment field:

> ALL SWIMMING POOL EQUIPMENT INSTALLED ON OR AFTER_____ _____FOR USE IN PUBLIC OR PRIVATE SWIMMING POOLS IN THIS JURISDICTION SHALL MEET THE APPLICABLE NATIONAL SANITATION FOUNDATION STANDARDS.

In fact, the adoption of this broad regulation will save time as well as advertising and printing costs as, no doubt, many different standards will be adopted. Otherwise, each standard will require the adoption of a specific regulation.

Wherever the legality of adopting legislation by reference is not recognized, delete the portion of either of the above regulations after the word "SHALL" and substitute therefor the words "BE OF A TYPE APPROVED BY THE HEALTH OFFICER." The health officer may be guided by the National Sanitation Foundation Standards in his approval of types.

COMMITTEES PARTICIPATING IN THE PREPARATION OF THIS STANDARD

NATIONAL SANITATION FOUNDATION COMMITTEE

on

SWIMMING POOL EQUIPMENT STANDARDS

1961

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NATIONAL SANITATION FOUNDATION

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—1961—

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† Deceased since adoption of Standard.

INTRODUCTION

The National Swimming Pool Institute was chartered in 1956 to raise the performance levels of the pool industry. The forward thinking members of the Institute very quickly recognized the need for developing standards for the variety of equipment then being marketed throughout the country. From a series of conferences between The National Sanitation Foundation and some of those early members of the Institute, the NSF Swimming Pool Equipment Evaluation-Listing Program was born.

The National Swimming Pool Institute is a trade association of firms at all levels of the industry—manufacturers, distributors, pool builders, maintenance firms, architects and so forth. As part of its mission to elevate the performance and image of the swimming pool industry through technical and management education, communications, strong ethics procedures and organizational development, the Institute has been a strong advocate of meaningful pool equipment standards and testing based on those standards.

The Institute promotes the development of equipment standards through appropriate product-oriented technical subcommittees, the NSPI Technical Council and the NSF Committee on Swimming Pool Equipment Standards. NSPI urges its members to seek the evaluation and Listing of equipment and solidly upholds the program before all its publics, both private and governmental.

The National Sanitation Foundation

STANDARD NO. 10

Relating To

SAND TYPE FILTERS

for

SWIMMING POOLS

Section 1. GENERAL

1.00 SCOPE: Sand type filters are covered in this Standard. The filters herein described are intended to be designed and used specifically for swimming pool water filtration, both public and residential. Included are the basic components which are a necessary part of the sand type filter such as filter housing, upper and lower distribution systems, filter media, supporting material (when required), piping, valves, gauges and such other accessories as required for the proper function and operation of such filters.

1.01 MINIMUM REQUIREMENTS: This Standard is established as a guide to the evaluation of the equipment covered herein and the requirements are considered to be basic and minimum. Variations are permissible when they make the equipment equally resistant to corrosion, wear and physical damage, or if they provide for equal operation and performance of the device. Variations shall be approved prior to their use.

1.02 ALTERNATE MATERIALS: Where specific materials are mentioned, it is understood that the use of other materials proven to be equally satisfactory for the intended end use will be acceptable.

1.03 REVIEWS AND REVISIONS: Following adoption of this Standard and prior to its printed publication, a general review shall be carried out by the National Sanitation Foundation Committee on Swimming Pool Equipment Standards to ascertain if additional requirements are indicated. Subsequent to the printed publication of this Standard, a complete review of the Standard shall be conducted at intervals of not more than three years to determine what changes, deletions or additions, if any, are necessary to maintain current and effective

requirements consistent with new technology and progress. These reviews shall be conducted by appropriate representatives from the public health, industry and user groups. Final adoption of any revision shall be in accordance with the procedures established by the NSF Committee on Swimming Pool Equipment Standards.

1.04 VARIATIONS IN DESIGN AND OPERATION: A sand filter varying in principle of design and/or operation from those set forth herein may qualify under the provisions of this Standard provided appropriate tests and investigations indicate that said filter produces filter cycles, performance, operation and service at least equivalent to those produced by equipment complying with this Standard. Such filters shall meet the requirements for materials, finishes and construction in this Standard.

Section 2. DEFINITIONS

2.00 ACCESSIBLE: Readily exposed for proper inspection and the replacement of media and/or parts with the use of only simple tools, such as a screw driver, pliers or wrench.

2.01 APPROVED: Found acceptable for the specific intended end use as determined by the National Sanitation Foundation when related to the use of the nSf Seal of Approval.

2.02 BACKWASH: The process of thoroughly cleansing the filter media by reverse flow and removing the accumulated foreign material from the filter system.

2.03 BACKWASH CYCLE: The time required to thoroughly backwash the filter media and the contents of the filter vessel.

2.04 BACKWASH RATE: The rate of application of water through a filter during the cleaning cycle expressed in U.S. gallons per minute per square foot of effective filter area.

2.05 DESIGN FLOW RATE: The flow rate in gallons per minute of a specific filter determined by multiplying the total effective filter area by the allowable flow rate per square foot.

2.06 LOWER DISTRIBUTION SYSTEM (UNDERDRAIN): Those devices used in the bottom of the filter to collect the water uniformly during the filtering and to distribute the backwash uniformly during the backwashing.

2.07 UPPER DISTRIBUTION SYSTEM: Those devices designed to distribute the water entering the filter in a manner such as to prevent

movement or migration of the filter media. This system shall also properly collect water during filter backwashing unless other means are provided.

2.08 EFFECTIVE FILTER AREA: The effective filter area is that portion of the filter surface that will operate at the design flow rate.

2.09 FILTER CYCLE: The operating time between backwash cycles.

2.10 FILTER MEDIA: A finely graded material (such as sand) which removes filterable particles from the water.

2.11 FILTER RATE: The rate of application of water through a filter during the filter cycle expressed in U.S. gallons per minute per square foot of effective filter area.

2.12 FREEBOARD: The clear vertical distance between the top of the filter media and the lowest outlet of the upper distribution system.

2.13 FRESH WATER: Those waters having a specific conductivity less than a solution containing 6000 ppm of Sodium Chloride.

2.14 REMOVABLE: Capable of being taken away from the main unit with the use of only simple tools, such as a screw driver, pliers or wrench.

2.15 SALINE WATER: Those waters having a specific conductivity in excess of a solution containing 6000 ppm of Sodium Chloride.

2.16 SUPPORTING MATERIAL: A material to properly support the filter media.

2.17 TOXIC: The word "toxic" shall refer to the adverse physiological effect to man.

2.18 TURNOVER: The period of time (usually in hours) required to circulate a volume of water equal to the pool capacity.

Section 3. MATERIALS

3.00 GENERAL: Any suitable material may be employed that will withstand normal handling and shipping and which will meet the requirements of corrosion resistance and pressure as outlined herein. The material shall be safe and shall not produce any toxic effect or impart undesirable tastes, odors or colors to the pool water.

3.01 COATING MATERIALS: Coating and lining materials (such as glass, rubber, plastic, bituminous, etc.) must be properly applied and of an approved type.

3.02 CORROSION RESISTANT MATERIALS*: Corrosion resistant materials will be accepted without coating of wetted surfaces. The following is a list of presently approved materials: (1) approved copper alloys (including bronze and brass), (2) AISI type 300 series stainless steel, (3) monel, (4) approved synthetic (plastic) materials, (5) approved concrete.

3.03 NON-CORROSION RESISTANT MATERIALS: Non-corrosion resistant materials shall be provided with a properly applied approved protective coating completely covering all wetted surfaces of internal and non-removable parts except where suitable corrosion allowances are specified. Cathodic protection may be included as an additional means of preventing or reducing corrosion.

3.04 DISSIMILAR METALS: Dissimilar metals not normally considered compatible on the electromotive scale shall not be in direct contact in the filter construction.

3.05 INSULATING FITTINGS: Insulating fittings shall be electrically nonconductive and if made of synthetics (plastics) they shall be of an approved material meeting the requirements of item 3.00.

3.06 FILTER PIPING MATERIALS—FRESH WATER APPLICATION: For fresh water applications approved plastic, galvanized steel or cast iron pipe with cast or malleable iron fittings and bronze or iron-bodied bronze fitted valves may be used in filter internal or face piping without protective coating. When such materials are used in the face piping with a steel filter tank, no insulating fittings shall be required.

3.07 FILTER PIPING MATERIALS—SALINE WATER APPLICATIONS: Piping for saline water applications shall be of the following corrosion resistant materials: aluminum brass**; 90-10 cupro-nickel; 70-30 cupro-nickel; monel alloy 400; approved PVC, ABS and Polyethylene plastics. Alternate materials may be approved under the provisions of Item 1.02 of this Standard.

* Variations and/or alternates to these requirements may be effected under the provisions of Item 1.01 and 1.02 of this Standard.

** Shall not be used where velocities exceed 8 feet per second.

Section 4. DESIGN AND CONSTRUCTION

4.00 FILTER TANKS, PRESSURE SERVICE:

4.001 PRESSURE REQUIREMENTS:

4.0011 WORKING PRESSURE: Tanks shall be designed for a minimum working pressure of 50 PSI with a 4 to 1 safety factor. When the maximum shut-off head of the pump used with the filter tanks exceeds 50 PSI, the tank shall be designed for this head with a 4 to 1 safety factor.

4.0012 PRESSURE TESTS: Tanks shall be tested for soundness and leakage at a pressure of 150% of the working pressure in Item 4.0011. Manufacturer shall furnish design calculations indicating burst pressures of at least 200 PSI.

4.002 SERVICE REQUIREMENTS:

4.0021 MATERIALS: Filter tanks not constructed of corrosion resistant material or lined with an approved coating, are permitted provided that plate thickness is increased by a corrosion allowance of 1/16 inch of ASTM type mild steel or its equivalent beyond that required by this Standard (Item 4.001).

4.0022 BURIED FILTERS: Tanks intended to be placed in the ground shall be of non-corrosive material or shall be steel plate at least 3/16 inch thick.

4.0023 TANK SUPPORT: All filter tanks other than those intended to be buried shall be self-supporting and shall provide adequate space for ventilation between floor and tank bottom. Tanks over 48 inches in diameter must be provided with adjustable type leveling legs.

4.0024 DRAINAGE OF TANK: Provision shall be made for completely draining the tank.

4.0025 ACCESSIBILITY*: Filters shall be equipped with a manhole of sufficient size to permit the replacement of the supporting and filtering media and all component parts which are intended for replacement and/or re-

* Variations and/or alternates to these requirements may be effected under the provisions of Item 1.01 and 1.04 of this Standard.

moval. However, in no case shall the opening on a 24 inch or larger diameter filter be less than a standard 11 x 15 inch manhole.

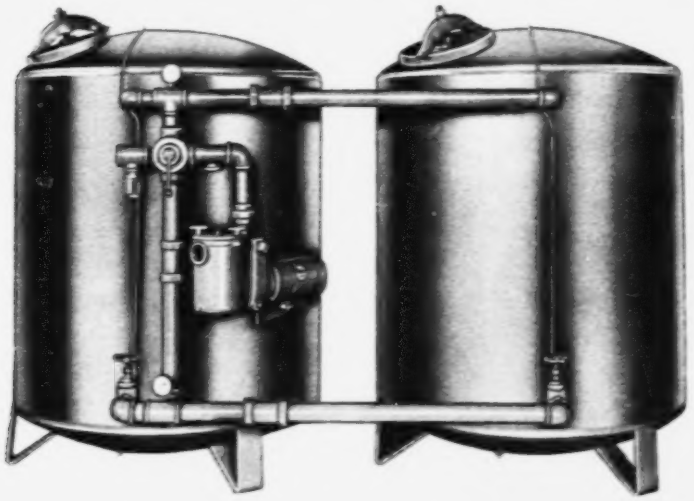
4.003 FILTER PIPING: All piping which is an integral part of the filter unit shall comply with design and construction requirements for water piping of the American Standard National Plumbing Code, ASA-A40.8-1955. Insulating fittings shall be provided when face piping material is not compatible on the electromotive scale with the material of the filter tank.

4.004 INITIAL PRESSURE DROP: The initial pressure drop through any filter operating at the design flow rate and measured from the filter tank inlet opening to the filter tank discharge shall not exceed 3 psi.

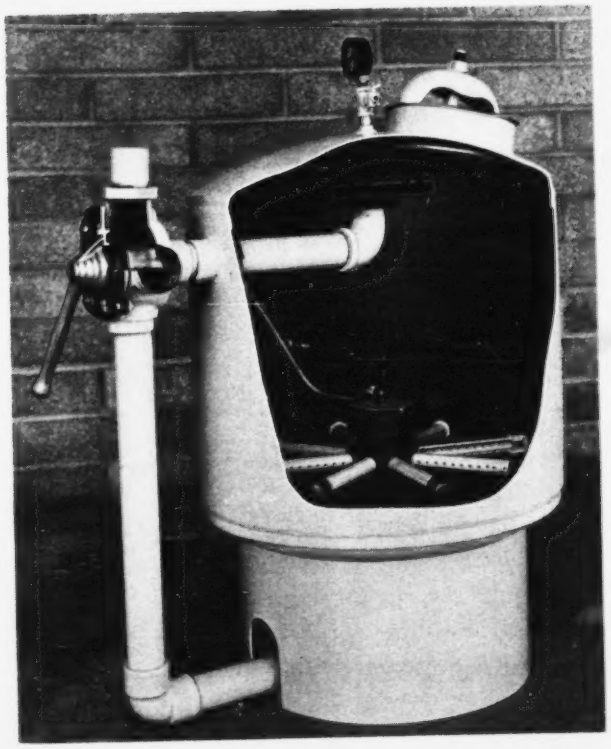
4.01 FILTER TANKS, VACUUM AND GRAVITY SERVICE:

4.011 PRESSURE REQUIREMENTS: Filter tanks shall be designed to withstand pressure developed by the weight of the water and media contained therein with a safety factor of 1½. Filters that may be closed during part of their operating cycle shall, in addition, be designed to withstand the crushing pressure developed by a vacuum of 25 inches of mercury with a safety factor of 1½.

4.012 FILTER PIPING, INITIAL PRESSURE DROP, ACCESSIBILITY AND DRAINAGE: The requirements of this Standard for pressure filters shall apply. (Items 4.002, 4.003 and 4.004)



Multiple Unit System—Sand and Gravel Filter



Cutaway View of Vertical Sand Filter

4.02 INTERIOR COMPONENTS:

4.021 UPPER DISTRIBUTION SYSTEM: All of the components in the upper distribution system shall be non-clogging and constructed so as to resist corrosion and physical deformation or wear. The system shall properly distribute incoming water during filter cycle so as to prevent any appreciable movement or migration of filtering media at the design flow rate. It shall properly collect water during backwash cycle and shall have a combined open area at least equivalent to that of the backwash effluent piping.

4.022 LOWER DISTRIBUTION SYSTEM: The lower distribution system shall be non-clogging and constructed so as to resist corrosion and physical deformation or wear; shall provide adequate flow and distribution to uniformly expand the filtering bed during backwashing and to uniformly collect the filtered water during the filter cycle. With the exception of filters employing the dome or similar type under-drain having openings 3/16 inches or larger, all components of the lower distribution system shall be replaceable through the manhole opening provided in the filter tank.

4.03 FILTER MEDIA:

4.031 FILTER SAND*: Filter sand shall be hard silicous material free of carbonates or other foreign material with an effective particle size of between .4 and .55 mm with a uniformity coefficient not exceeding 1.75. Depth of filter sand shall be a minimum of 20 inches.

4.032 SUPPORTING MATERIAL*: Where gravel is used to support the filter sand, it shall be rounded material free of limestone and clay and shall consist of at least four layers properly graded to prevent intermixing. The total bed depth is not to be less than 10 inches above the lower distributor openings.

4.04 FILTER OPERATION: When installed in accordance with the manufacturer's recommendations and when operated in the filter or backwash cycle in accordance with the manufacturer's specified rate, the filter media shall perform the following functions:

4.041 The sand shall be of proper gradation and weight so that there will be no media lost in the backwash operation using a rate of 15 GPM per square foot of filter area, or the manufacturer's recommended backwash flow rate, whichever is greater.
4.042 The sand shall be thoroughly cleaned when backwashed per the manufacturer's specifications.

High-Rate Commercial Sand Filter

* Variations and/or alternates to these requirements may be effected under the provisions of Item 1.01 and 1.04 of this Standard.

Vertical High-Rate Sand Filter

4.043 The filter media and supporting material shall not migrate during the filter cycle and shall remain reasonably flat and level when operated at the design flow rate.

4.044 The filter media and supporting material shall be non-toxic and shall impart no color, taste or odor to the pool water.

4.045 The filter bed shall not break down or channel in the filter cycle when subjected to a 15 psi pressure differential across the filter bed.

4.05 FREEBOARD*: A freeboard of at least 12 inches shall be provided between the top of the sand and the lowest drawoff point of the upper distribution system.

4.06 AIR RELEASE: Each pressure filter tank shall be equipped with a manual, continuous or automatic air release connected at the top of the tank that will expel air which enters the filter tank. A means shall be provided to permit the manual operation of the air release.

4.07 OPERATION INSTRUCTIONS AND DATA PLATE:

4.071 MANUAL: A manual of instructions shall be provided with each filter and shall include drawings, illustrations, written

* Variations and/or alternates to these requirements may be effected under the provisions of Item 1.01 and 1.04 of this Standard.

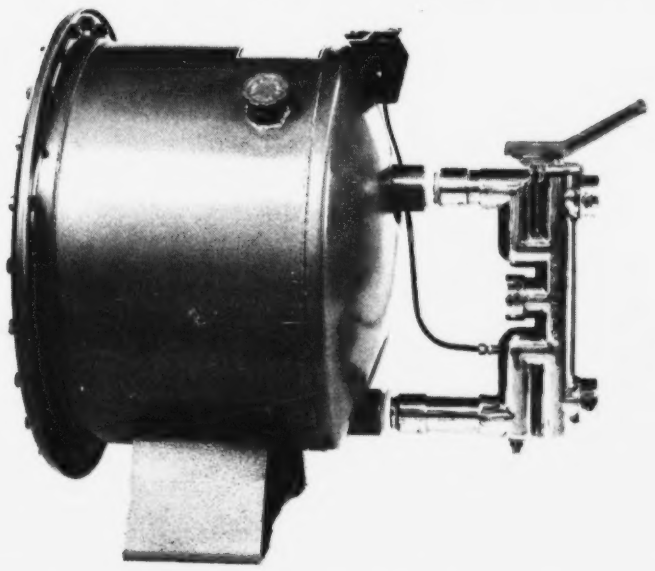
operating instructions, charts and parts list to permit proper installation, operation and maintenance of the particular model of filter involved.

4.072 DATA PLATE:

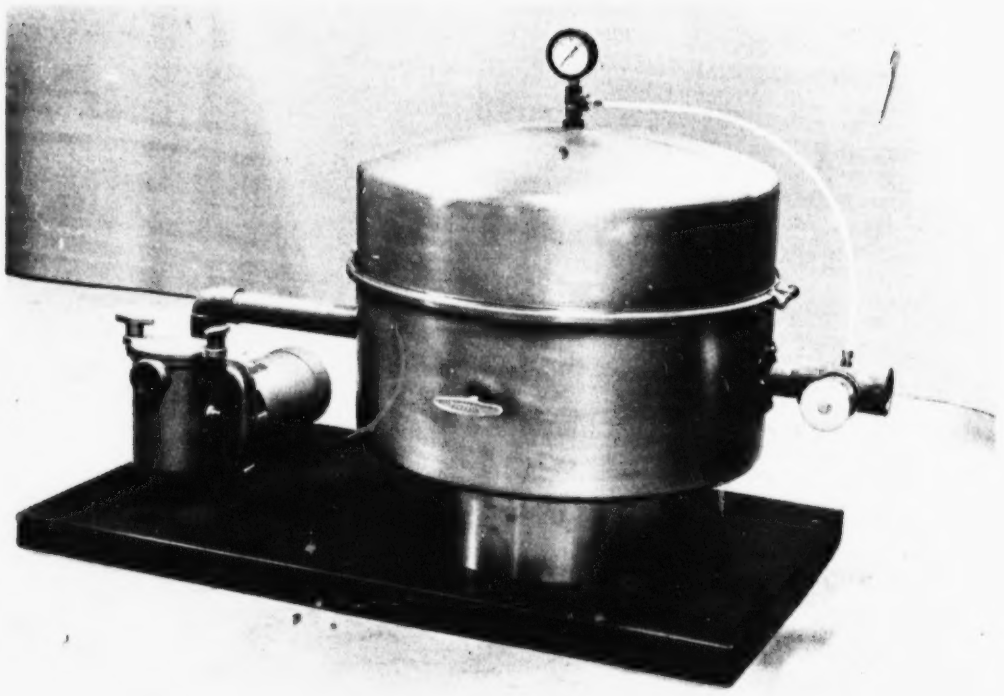
4.0721 TYPE AND LOCATION: Data plates shall be of permanent nature, so inscribed as to be easily read and understood and securely attached to the filter plant.

4.0722 CONTENTS: Data plates shall contain the following information:

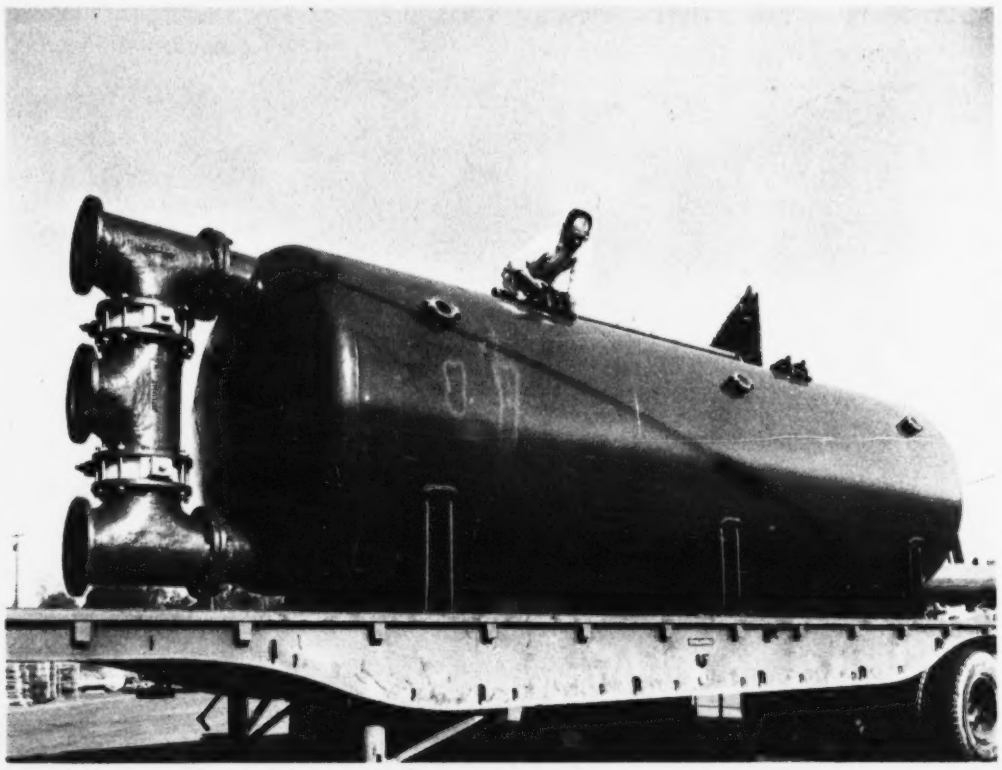
(1) Manufacturer's name and address
(2) Filter model number
(3) Filter serial number
(4) Effective filter area in square feet
(5) Required clearance (vertical and horizontal) for service and maintenance
(6) Design flow rate in US GPM (filtration and backwash)
(7) Maximum working pressure
(8) Suitability for buried type installation
(9) Briefly stated, in order, the steps of operation
(10) The data plate shall indicate whether the unit has been tested for fresh water only, or for fresh water and salt water applications.



Residential Horizontal High-Rate Sand Filters with Integral Face Piping



Residential Vertical High-Rate Sand Filter



Commercial Horizontal High-Rate Sand Filters with Partial Face Piping

4.073 VALVE IDENTIFICATION: All valves shall have a permanent identifying label or tag attached.

4.08 MECHANICAL OR MOVING PARTS:

NOTE: Material specifications are covered in Section 3—Materials

4.081 PIPING, VALVES AND FITTINGS: Pipe, valves and fittings shall be checked for correctness of use, thoroughness of fabrication and/or assembly and adequacy of support. When filters are supplied without required face piping, valves and fittings, an approved piping diagram, parts list and installation procedure shall be provided by the manufacturer.

4.082 ASSEMBLY: Piping assembly shall be arranged to permit disassembly of component parts for maintenance and repair.

4.083 MOVING PARTS: Moving parts, other than manually operated valves, shall be selected for a normal life expectancy of no less than five years.

4.084 CLOSING AND SEALING DEVICES: Mechanical clamps, gaskets and tightening elements shall be selected for aptness of application and adequacy.

4.085 FUNCTION : The entire equipment and each component part shall be fully checked in actual operation to verify that the various functions are correctly and adequately performed. The manufacturer's instructions shall be carefully followed in this step-by-step operation. Functions referred to include face piping, filtering, filter to waste, draining and air release.

4.09 DESIGN CRITERIA:

4.091 DESIGN FLOW RATE**: The filter design flow rate shall be a maximum of 3 GPM per square foot for public pools and 5 GPM per square foot for residential pools.

4.092 DESIGN BACKWASH RATE**: The design backwash rate shall be a minimum of 15 GPM per square foot for public pools and 10 GPM per square foot for residential pools.

**Variations and/or alternates to these requirements may be effected under the provisions of Item 1.01 and 1.04 of this Standard.

RECOMMENDATIONS FOR INSTALLATION AND OPERATION

The following is not a basic part of the Standard and as such is not the responsibility of the manufacturer. However, to obtain proper results the following limitations should be considered in the overall hydraulic design of the pool. Permanent media type filters designed and constructed in accordance with this Standard will give satisfactory results when properly installed and connected to satisfactory recirculating pump, piping and services and operated in accordance with the manufacturer's recommendations. The method of installation and operation should be in conformance with the manufacturer's recommendations and the applicable state and local laws and regulations.

A. RECOMMENDED INSTALLATION

I. TURNOVER: The turnover will vary depending upon classification of pool, bathing load and type of usage within the following maximum turnovers:
   a. Heavily used public-type pools—not more than 6 hours
   b. Other public-type pools—not more than 8 hours
   c. Residential pools—not more than 12 hours

II. PUMPS: Pumps should be selected to meet the requirements of design flow rate and design backwash rate under the use condition. Care must be taken to provide sufficient reserve head to overcome friction losses in the piping and appurtenances through which the water must flow after discharge from the pump in returning to the pool. For from one to three unit installations, the pump characteristics are usually governed by the Design Backwash requirements.

III. GAUGES AND RATE OF FLOW INDICATOR: An approved type pressure gauge (or gauges) with an appropriate range should be provided on both the influent and effluent lines of all filter systems. A rate of flow indicator with an appropriate range should be provided in connection with filters for public pools. A flow rate controller is also recommended for installation in public pool systems.

IV. LOCATION: Filters should be so installed as to provide easy accessibility for cleaning, operation, maintenance and servicing. Tanks should be so positioned as to provide adequate circulation of air beneath and on all sides when necessary to reduce corrosion and to permit cleaning. When filters are installed in the ground

(buried) they should be adequately protected against external corrosion and installed in accordance with the manufacturer's recommendations.

B. OPERATION AND MAINTENANCE

In order to obtain the ultimate in performance from any permanent media filter, there are several factors which must be taken into consideration and kept under control.

I. FLOW RATE: The flow rate through any permanent media filter determines the total output of the filter. Too high a flow rate will invariably reduce filter runs disproportionately. The converse is true of lower filter rates. Optimum results may usually be obtained by maintaining flow between the flow rates recommended by the manufacturer.

II. FILTER AIDS (Coagulants): The use of proper filter aids enhances the efficiency of filtration. The manufacturer's instructions should be followed carefully if the maximum advantage is to be gained from the use of filter aids, coagulants and pool chemicals.

III. ROUTINE CLEANING: Regular and thorough cleaning of the filter is necessary for the correct maintenance of a swimming pool, whether it be a public or residential one. This will result in labor-saving and in extended life of the equipment, as well as in correct water clarity.

The following points should be checked regularly:

a. Clean pump strainer and other strainers regularly, particularly before and after vacuum cleaning pool and before cleaning filter.

b. Lubricate motor according to manufacturer's recommendations.

c. Keep pump shaft and valve stem packings in good condition.

d. Inspect filter media and inside of filter tank at least once a season and make necessary repairs or adjustments.

e. Repair any leaks immediately.

f. Keep surfaces protected against corrosion by painting or cleaning regularly.

g. Backwash filter regularly and thoroughly.

h. Inspect and clean air relief system regularly.

i. Properly drain the indicated equipment and appurtenances on closing down the pool in those areas subject to freezing.

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SANITATION is a way of life. It is the quality of living that is expressed in the clean home, the clean farm, the clean business and industry, the clean neighborhood, the clean community. Being a way of life it must come from within the people; it is nourished by knowledge and grows as an obligation and an ideal in human relations.

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